

The April part will contain a long paper, with map, by Prof. Hertzberg, on the Ethnology of the Balkan Peninsula in the fourteenth and fifteenth centuries, and the conclusion of the paper on Prof. Nordenskjöld's proposed expedition from Norway to Behring's Straits. There is also the itinerary (with map) of a journey between Ozaka, Kioto, Nara, and Omimesanjo, in Nippon, Japan, by Dr. Knipping.

AMERICAN GEOGRAPHICAL SOCIETY.—In the *Bulletin* of the Society, No. 5 (1876-7) will be found a pretty full account of the work of the American Palestine Exploration Society, by Dr. Merrell, and a paper on a trip up the Magdalena, and among the Andes, by Mr. J. A. Bennett, U.S. Consul at Bogotá. At the meeting of the society on February 27, the president, Chief-Justice Daly, gave his annual address, summing up in an interesting and complete manner the geographical work of the past year.

BERLIN GEOGRAPHICAL SOCIETY.—The fiftieth anniversary of the foundation of this Society will be celebrated in the Kaisersaal of the Flora. The Crown Prince of Germany, several ministers, and numerous foreign guests, are expected to be present at the festival, which will begin on April 31. The last three numbers for 1877 of the *Verhandlungen* of this Society contain some papers which may interest geographers and ethnologists. Among these (in No. 8) are a paper by Prof. Virchow on "The Anthropology of America," and in the same number a paper on "The Hygiene of the Tropics," by Herr Falkenstein; in No. 10 a paper by Dr. Hildebrandt on his travels in East Africa, in his attempt to reach Mounts Kenia and Kilima-Njaro, to which we have already referred.

SUMATRA.—The Dutch Geographical Society has recently received important news from the Expedition in Sumatra. MM. van Hasselt and Veth report that in the course of their exploration of the southern highlands of Padang, they ascended the Peak of Indrapura, the highest mountain in Sumatra. From the summit of this volcano they had an extensive view over the land and lakes of Korintji. The travellers also report that of late they had met with less enmity on the part of the independent chiefs than at the outset of their expedition.

NOTES

DURING the field operations of one of the parties connected with the U.S. Geological Survey of the Territories, in charge of Prof. F. V. Hayden, portions of south-western Colorado, north-western New Mexico, and north-eastern Arizona, were traversed, embracing that broken-up country occupied in remote times by a race of people who were known as the cliff-dwellers. This subject is well known to readers in general, but we must recur to it again so as to be able to reach the importance of the discovery to be described. In one of the cañons, known as the Chaco, Mr. H. W. Jackson made detailed investigations and measurements of the immense ruined buildings. In one of the arroyos or dry water-courses, the sectional view of the alluvial deposit was exposed to a depth of about sixteen feet. Fourteen feet beneath the surface, a layer of pottery and *débris* came to view. This may not seem strange, as, in a comparatively narrow valley, dirt and gravel to the depth of fourteen feet might be deposited in a short term of years. But ten feet above this layer the foundation walls of ancient buildings were visible, built upon another layer of gravel and sand. These were in time covered with the alluvium upon which now stand the famous ruins, of which no history is extant, and of the builders of which no history will ever be known. How many ages have passed since the lower or first bed was the surface upon which moved the numerous hordes, of which all evidence at present is hidden behind the veil of the dark past? Now, a skull comes to view upon the layer of pottery, which is beneath two eras of occupation

and semi-civilisation. This skull, in its contour, is unique. Its closest relations are the ancient Mexicans, Peruvians, Caribs, and Natchez. There is an extraordinary flattening of the upper posterior portion of the head (posterior parietal), which is evident in those figured in Morton's *Crania Americana*. The contents of the skull as found, consists of sand, which is now as hard as ordinary agglutinated sandstone, and has, in nearly all portions, the appearance of limonite. The skull will be described and figured by Dr. W. J. Hoffmann, of the U.S. Survey, and it affords another strong link in the chain of facts and hypotheses of the cliff-dwellers and the ancient Mexicans being more nearly related than is generally admitted or supposed.

MR. PARK HARRISON telegraphs to us from Worthing that he has just (yesterday) exhumed, at Cissbury, a contracted skeleton, sixteen feet deep, lying in the centre of the pit, over which the cist was found last autumn. The work will be continued on Saturday and next week.

A SCRUTINY took place on the 18th instant at the Academy of Sciences for the nomination of a successor to M. Leverrier as member of the section of astronomy. The successful candidate was M. Tisserand, the Director of Toulouse Observatory, who took thirty-two votes out of fifty-five, against M. Wolf. M. Tisserand was the second astronomer of the Japan Mission for the Transit of Venus, which was led by M. Janssen.

As we have already stated, a subscription list has been opened in France for the foundation of a memorial to Claude Bernard. A small sub-committee has been formed to obtain subscriptions in this country, consisting of Sir James Paget, Dr. J. Burdon Sanderson, Prof. Humphry, Dr. Michael Foster, Mr. Ernest Hart, Mr. Romanes, and Prof. Gerald Yeo, King's College, to the latter of whom, as honorary secretary of the Physiological Society, subscriptions may be sent.

PORTER and COATES of Philadelphia are about to bring out a new and cheap edition of Wilson and Bonaparte's "American Ornithology," three volumes in one, together with 103 new plates.

THE report of Major Feilden, the naturalist of the Arctic Expedition, is now nearly completed, and will shortly make its appearance as a Parliamentary Paper, together with some interesting additional remarks by Sir George Nares.

GENERAL DE NANSOUTY published in the beginning of March a letter stating that a sum of 20,000 francs was required to complete the Pic-du-Midi Observatory, of which he is director. Three days after the publication of his letter in the *XXIXme Siècle*, an inhabitant of Calais sent him 5,000 francs, and five days later he was presented with a sum of 15,000 francs by M. Bischofshelm, the eminent Parisian banker, whose generosity to science we have so often to record.

Brownnea grandiceps is producing its fine *Rhododendron*-like heads of flowers in No. 1 house at Kew.

KING HUMBERT of Italy has granted four annual prizes of 5,000 lire each (about 190*l.*) for the best productions in art, science, and literature. The Academia dei Lincei, at Rome, is charged with the annual award and distribution of these prizes.

A COMPETITIVE trial of German and Swiss chronometers took place recently at the Deutsche Seewarte at Hamburg, by order of the German Admiralty. The best instrument was furnished by Herr Bröcking, and its performance is said to be superior to that of any chronometer examined at Greenwich during the last three years.

MAJOR-GENERAL SIR HENRY RAWLINSON, K.C.B., F.R.S., and Sir John Lubbock, M.P., F.R.S., have been appointed trustees of the British Museum in the place of the late Right Hon. Sir David Dundas and the late Sir William Stirling Maxwell.

THE death is announced of Dr. Joseph Henry Corbett, of Dublin. The deceased was formerly Professor of Anatomy and Physiology, and an Examiner in the Queen's University in Ireland.

WE understand that the herbarium of the late eminent botanist, Alexander Braun, has been purchased by the German Government for the sum of 21,000 marks.

THE cryptogamic herbarium of the late Italian botanist, G. De Notaris, has been acquired by the Italian Minister of Public Instruction for the Botanic Garden at Rome.

WE are happy to state that a decree has established in Lyons, in Bordeaux, and in Besançon observatories for astronomical, meteorological, and horological purposes. For the two former towns, and especially for Lyons, this decree is merely an acknowledgment and regulation of former efforts, but the merit of this measure is not lessened by that consideration, as it puts an end to all local opposition.

EASTER being very late this year, the meeting of the delegates of the French learned societies will take place in the last days of April, only three or four days before the opening of the International Exhibition.

AT a meeting at the Mansion House last week an influential committee was formed to promote the holding of a great agricultural exhibition in London next year, under the auspices of the Royal Agricultural Society of England. Hyde Park was proposed as the place for holding the show.

A SHOCK of earthquake is reported to have been felt at Debenham, a few miles from Ipswich, on Saturday morning.

THOUGH the cultivation in India of the best quinine-yielding species of *Cinchona* (*C. officinalis*) has not proved a success, it is satisfactory to know that one species at least thrives most abundantly in the Sikkim plantations. From a paper read at the last meeting of the Pharmaceutical Society by Mr. Wood, the Government Quinologist in India, it seems that out of a total of about three million trees, comprising four or five species of *Cinchona* it is estimated that there are as many as 2,500,000 belonging to the species *succirubra*. It is from this bark that the now well-known "*Cinchona febrifuge*" is prepared. This substance, according to many well known medical practitioners in India, possesses to so very nearly the same extent the anti-periodic properties of quinine that it may be safely substituted for the latter in the treatment of ordinary fevers and ague. 5,000 lbs. of this febrifuge, we are told, has already been made and issued, and it is now being made at the rate of 4,000 lbs. a year; the demand, however, is so rapidly overtaking this scale of production that a further extension will shortly be necessary. For use it appears in the form of a fine white powder, which, however, becomes in a short time of a pale buff tint. It does not agglutinate even in the Indian climate. It is freely soluble in weak acids and is readily taken up by lemon-juice, which constitutes a pleasant vehicle for its administration.

THE Pharmaceutical Society of Great Britain has just issued an excellent catalogue of the fine collections of *Materia Medica* and chemical products in their museum in Bloomsbury Square. The catalogue is the work of the Society's Curator, Mr. E. M. Holmes, F.L.S., and includes a great deal of information regarding the several products mentioned. The alphabetical classification of the plants according to their genera in each order and the numerous references to figures in English, American, and foreign works will make this book valuable not only to students of the collection it illustrates, but also for handy reference on the subject generally.

THOSE who are interested in the subject of railway brakes will obtain much instruction and pleasure by a visit to the offices of the Westinghouse Brake Company, at St. Stephen's Palace Chambers, Westminster, where the Company's Automatic Brake

may be seen at work. By an ingenious arrangement the brake-power sufficient for a train of ten carriages is represented. At one view the whole of the apparatus that would be brought into play to bring such a train to a stop is seen. A steam-engine compresses the air and distributes it through all the tubes and the ten reservoirs extending over the whole length of the train, and which, by simply turning a handle, acts upon the brakes, one of which is ready to clasp each wheel of the train. The brake can be applied by engine-driver or guard in little more than five seconds, and its action is so powerful that a train going at forty miles an hour can be brought to a dead stop in something like fifteen seconds and within a distance of about 500 yards. The essential principle of this system is the admission of compressed air into a cylinder attached underneath a carriage, and containing the ends of two pistons acting by leverage upon the brakes; the compressed air is stored in pipes attached to the cylinder, and is thus ready for instantaneous admission, which is effected by producing a reduction of pressure, and thus opening a set of valves that admit the air into the cylinder. The air thus admitted acts upon the pistons by pushing them out and causing the brakes to clasp the wheels and instantly stop their revolution. The distinctive feature of the automatic brake is that in case of the train breaking into one or more parts or in case of its meeting with any obstruction or leaving the rails, the brakes are at once applied automatically, and thus the risk of disaster is immensely diminished. Our examination of the apparatus has convinced us of its perfect efficiency, which we find is testified to by all the railway companies that have used it; and any one who has recently travelled north by the Midland Railway must admit that it would be difficult to improve upon a system that can bring a long train going at full speed to a stop within a few seconds. The brake can be applied with any strength, and thus is of great service in going down inclines and taking sharp curves. On the apparatus at St. Stephen's Chambers is a nozzle from which the compressed air may be allowed to escape, and with which some curious phenomena with a hollow elastic ball are shown. The ball is placed within the current of escaping air, and if the tap is kept upright the ball is sustained as if by a jet of water, but with little or no revolving motion. If the tap be brought to an angle of say thirty or forty degrees from the perpendicular, the ball is still sustained by the current, receding and advancing in the line of the tap and revolving rapidly outwards in the direction of the current, so rapidly as to produce a most marked flattening at the poles or sides at right-angles to the direction of motion. Ultimately it becomes almost a disc. Gradually the axis of rotation changes till it is at right-angles to its original position, when the speed of rotation diminishes and the ball gradually comes to rest. Again it begins to spin upon its new axis, going through the same changes again and again so long as it is kept within the action of the jet. In conclusion we may say the brakes are comparatively simple in construction; it is almost impossible to put them out of order, and they may be effectually handled by ordinary railway officials.

THE method of coincidences has recently been applied by M. Sathmari, to determine the velocity of sound in free air, as follows:—A pendulum, whose rate was accurately known, closed, at each passage through the vertical position, a battery circuit, the line of which was 220 m. long, and included two electric bells. When both bells are placed before the observer, he hears them simultaneously. If one be moved a little way off this simultaneity ceases; and if the bell be moved still further a point is reached, at which both bells are heard simultaneously again. The distance is that through which the sound moves in the interval between two successive ringings of the bells. The pendulum, in the present case, had a period of 0.2961 seconds; the distances at which the sounds of the two bells were heard at

once were directly measured, and the average value (from thirty measurements) was 99.25 m. From this the velocity of sound in free air = 335.19 m. Reducing the value to that for dry air at zero the number obtained is 331.57 m. This lies about midway between Regnault's value (330.7) and that of Moll and Van Beck (332.26).

At a recent meeting of the Berlin Geographical Society, Prof. Karsten, of Kiel, read an interesting account of the activity of the Commission established in Schleswig-Holstein, which has for its object the exact and minute investigation of the climatological, physical, and chemical conditions of the Baltic and the German Ocean, as well as of the influence which these conditions exercise upon organic life. The commission has established a large number of stations for making observations of the currents existing in these seas, in order to obtain data for the understanding of the general laws governing marine currents. With regard to animal life, the commission has up to the present confined its labours to the most important inhabitant of the two seas, the common herring, and it has succeeded in determining with certainty the few zoological varieties of this fish, as well as in finding its spawning places, and as a result, the artificial cultivation of herrings has already been set on foot. The commission will now devote its attention to other species of fish.

A GERMAN Viticultural Society has just been formed at Cassel. For the present the Society intends to take up two important matters, viz., (1) discovering the best method for the destruction of phylloxera, and (2) the suppression of the secret manufacture of wines by artificial means.

IN NATURE (vol. xvii. p. 372) an account is given of the difficulty met with in Australia in getting bees to work after a few years. A correspondent calls attention to the fact that a similar difficulty occurred in California, where it has been obviated by a systematic abstraction of the honey as the bees collected it. If this were tried in Australia it might possibly meet the difficulty.

In a recent communication to the Belgian Academy on digestion in insects, M. Plateau, after a careful examination of forty individuals of various types retires from his former position that the digestive juices (in the normal state) are *never acid*. In insects which feed wholly or partly on animal matters, they are slightly acid. He will not, however, concede a constant acidity for all insects (which some naturalists affirm); and in reply to the objection based on the characteristic acidity of the gastric juice of vertebrates, he contends that the digestive liquid in articulates, insects, myriapoda, arachnida, and crustacea is not analogous to that juice, but rather to the pancreatic juice; the acidity is an accessory character and not the sign of a physiological property. The ferment present is evidently something quite different from the gastric pepsine of vertebrates. Thus, a very little hydrochloric acid, so far from promoting its action, retards or arrests it.

A NEW method, said to be more accurate in its results than that of Helmholtz, for determining the tones of the mouth-cavity which correspond to the vowels, is recommended by M. Auerbach in a recent number of the *Annalen der Physik*. It is based on percussion. Having made a long inspiration, you bring the mouth into the position corresponding to the particular vowel, and then strike the larynx after the manner of physicians, i.e., place the middle finger of one hand firmly on it, and strike it with that of the other hand. A comparatively distinct tone is then heard, which varies with the position of the mouth, but for a given position is always the same. The effects are perceived more distinctly if the ears are previously stopped with wax. M. Auerbach describes results of observation by this method.

MR. A. W. BENNETT (Lecturer on Botany, St. Thomas's Hospital, London, S.E.) requests us to state that he is engaged on an introductory handbook of Cryptogamic Botany, to be pub-

lished in the International Scientific Series, and that he will be extremely glad of any recent original memoirs, English or Foreign, bearing on any branch of the subject which the authors may incline to send him.

AN International Congress of Botany and Horticulture will be held in Paris on August 16 and following days, under the auspices of the Botanical Society and the Central Horticultural Society of France, in the rooms of the latter Society, 84, rue de Grenelle. A programme of subjects, botanical and horticultural, is announced, on which papers are especially invited, as well as the exhibition of illustrative specimens, collections, and apparatus. One of these subjects is the establishing and fitting up of botanical laboratories. The attendance and co-operation of foreign botanists are cordially invited.

In the year 1877 no less than 8,000 new publications appeared in Italy. Amongst these there were 5,743 new books (1876 : 4,323), 1,880 pamphlets (1876 : 1,524), and 194 new journals (1876 : 256).

THE additions to the Zoological Society's Gardens during the past week include two Common Marmosets (*Hapale jacchus*) from South-East Brazil, presented by Mr. R. Donaldson; a Three-striped Paradoxure (*Paradoxurus trivirgatus*) from India, presented by Capt. Dalrymple; a Secretary Vulture (*Serpentarius reptilivorus*) from South Africa, presented by Messrs. W. Rigg and J. Curtis; a Green Glossy Starling (*Lamprocolius chalybeus*) from North-East Africa, a White-eared Bulbul (*Pycnonotus leucotis*) from India, a Californian Quail (*Callipepla californica*) from California, presented by Mrs. Arabin, F.Z.S.; a Common Kestrel (*Tinnunculus alaudarius*), European, presented by Mr. A. Blumenthal; a Lion (*Felis leo*) from Africa, a Variegated Sheldrake (*Tadorna variegata*) from New Zealand, received in exchange; two Common Swans (*Cygnus olor*), European, deposited; three Black Swans (*Cygnus atratus*), bred in the Gardens; a Zebu (*Bos indicus*), two Common Badgers (*Meles taxus*), born in the Gardens.

THE ANALOGIES OF PLANT AND ANIMAL LIFE¹

II.

WE may find a kind of analogy for these cases of contradictory action—for they really strike one as contradictory.

The chameleon and the frog are both affected in a peculiar manner by light; they both change colour in accordance with variations in the intensity of the light. Moreover, the change of colour is produced by the same mechanism in the two cases; by a kind of contraction and expansion of certain coloured cells in their skin. But the curious fact is that chameleons² become darker in sunshine, while frogs³ become pale in sunshine and darker in darkness. No doubt both these changes are in some way serviceable to the frog and the chameleon, and we may suppose that the whole phenomenon is really analogous to the opposite effects of light which occur in plants.

To quit the paths of science for those of another region of "Wonderland," it has been pointed out by Mr. Lewis Carroll that dogs wag their tails when they are pleased, whereas cats do so when angry. Seriously the principle is the same—given that emotion produces disturbance of the tail, it will depend on the surrounding circumstances in which the creatures live as to whether a given emotion shall produce a wagging or a rigid tail.

Let us once more consider what needs will arise in the life of an animal, and then see how the same needs are supplied by plants. An animal needs to be alert to changes going on in the world around it; it needs delicate sense-organs to perceive the approach of enemies or the whereabouts of its food. In fact it is evident that to prosper in the varying conditions of life an animal must be sensitive to these changes. By sensitiveness one

¹ A Lecture delivered at the London Institution on March 11 by Francis Darwin, M.B. Continued from p. 391.

² Brücke, *Wien. Denkschrift*, 1851; v. Bedriaga, "Die Entstehung der Farben bei den Eidechsen," 1874.

³ Lister, Cutaneous Pigmentary System of the Frog. (*Phil. Trans.*, 1858; v. Wittich, Müller's *Archiv*, 1854.